UPN 5
KYES • ANCHORAGE

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Secretary
Federal Communications Commission
1919 M. St. NW
Washington, DC 20554

21 November, 1996

Secretary;

Please find enclosed, ten ORIGINAL, SIGNED copies each, of two filings in MM Docket 87-268. One relates to a specific channel allotment in Homer, Alaska, the other expresses more general concerns of Fireweed Communications Corporation, owner of KYES-(TV), Anchorage, Alaska, regarding DTV and advanced television.

If you have any questions concerning this matter, do not hesitate to call me at 907-248-5959, my direct line at KYES.

Yours,

Jeremy Lansman
President, Fireweed Communications Corporation

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Fireweed Communications Corp.
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Before the

Federal Communications Commission
Washington, D.C.

In the Matter of	)	
Advanced Television Systems	)	
and Their Impact upon the	)	MM Docket No. 87-268
Existing Television Broadcast	)	
Service	)	

Comments in response to the Sixth Further Notice Of Proposed Rule Making
Fireweed Communications Corporation
KYES-TV, Anchorage, Alaska

To: The Commission: November 20, 1996

Fireweed Communications Corporation ("Fireweed") , licensee of KYES-(TV), Anchorage, AK., respectfully submits these comments in response to the Sixth Norice of Proposed Rule Making, released on August 14, 1996, 61 F. Reg. 43209, August 21, 1996.

SUMMARY

KYES-(TV), Channel 5, Anchorage, Alaska, may not survive a permanent change to a UHF channel, as proposed. However, at little cost, KYES could operate a small temporary digital UHF channel. During DTV transition, KYES could, at no cost, convert channel five to Digital and the UHF temporary channel to NTSC, simply by swapping exciters between the UHF and VHF transmitters. Following transition, KYES would return the low power UHF channel to the government.

KYES serves communities and area not served by any other TV station. See figure 1, below. DBS is too weak to reach this area without expensive, large dishes. Cable TV is not available in any location between the present KYES grade A and Grade B contour.

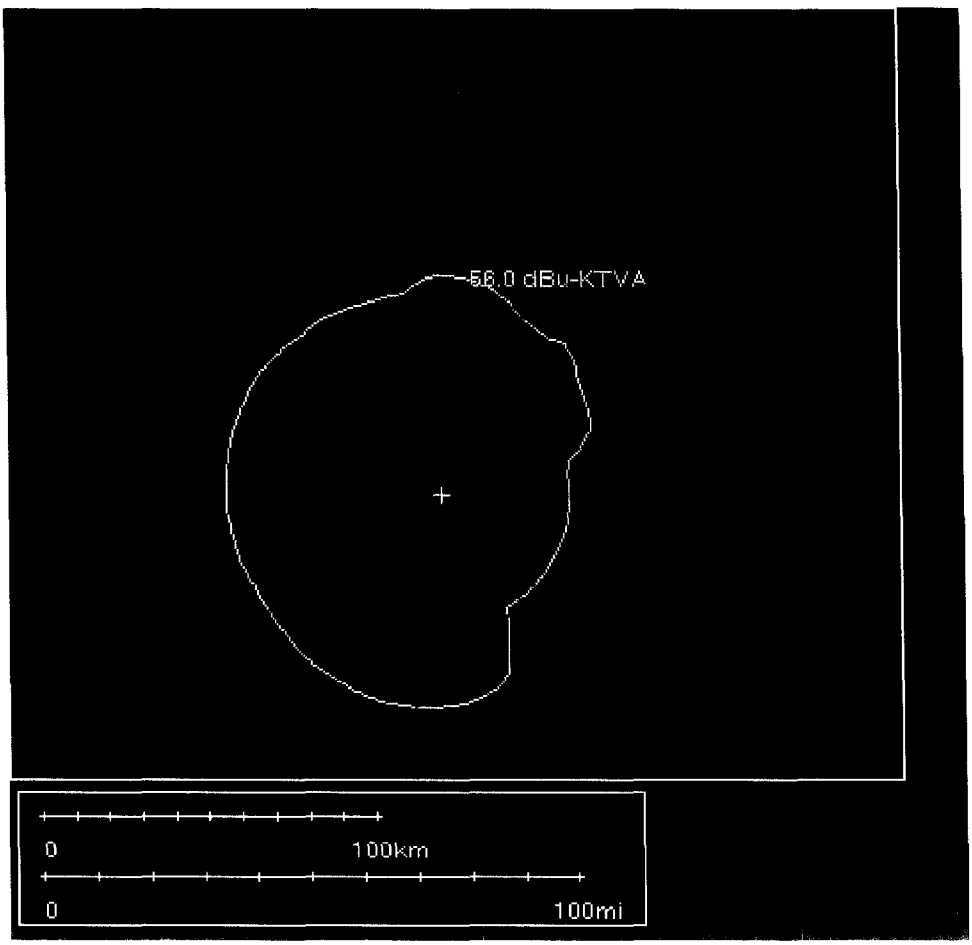

FIGURE 1
Coverage of all existing TV stations in South Central Alaska.

Examples of small communities within the KYES grade B and not within any other station grade B contour include, but are not limited to, Sterling, Talkeetna, Nikishka, and Trapper Creek.

As shown below, a switch to UHF would reduce KYES coverage. Even assuming KYES could afford a reasonably sized 1.24 megawatt peak power (312 kW average DTV) facility, coverage would be lost in white areas covered by no other station. Figure 2 is a comparison of present KYES 100 kW VHF Grade B and 312 kW UHF-DTV cliff contours using cliff field strength as proposed in the NPRM.

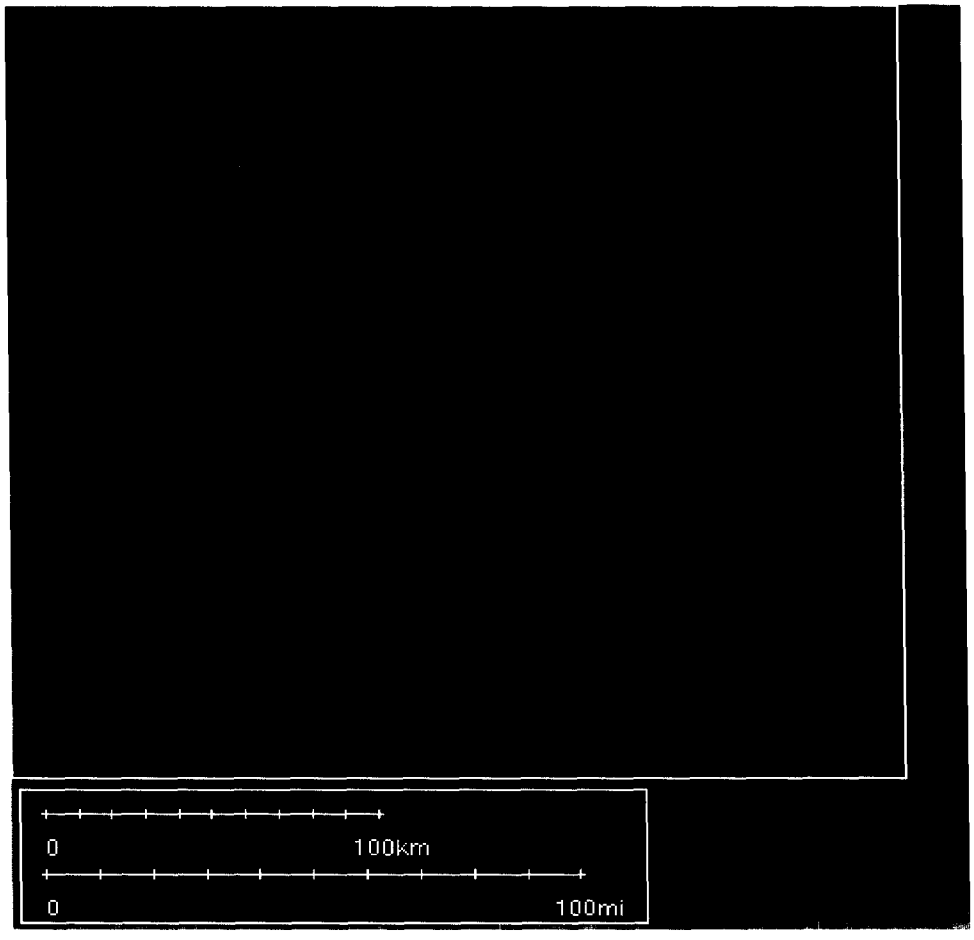

FIGURE 2
Green represents the present KYES Grade B contour
Red represents a 312 kW (average) UHF-DTV cliff contour

As shown below, UHF Propagation cannot cover parts of Anchorage that VHF can and currently does reach. Figure 3 shows in red, loss of coverage in the Eagle River section of Anchorage, Alaska, an area near by the KYES tower.

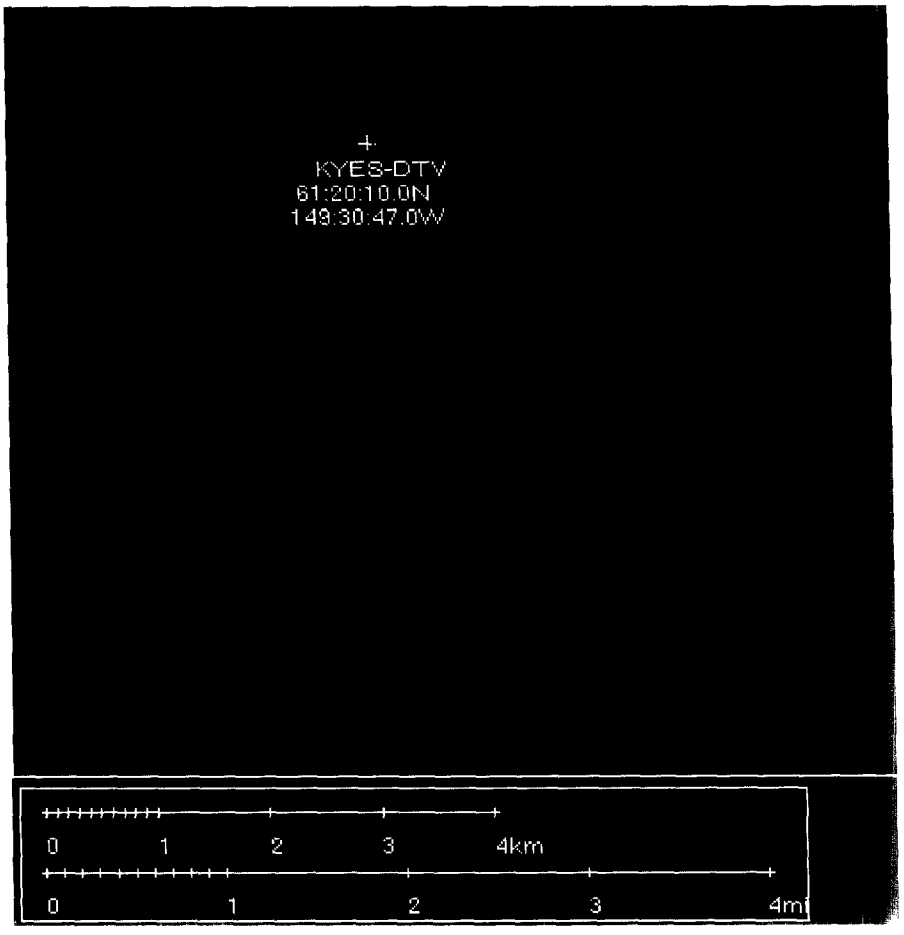

FIGURE 3

Bullington Coverage Study

Green represents 43.8 dBu area covered by a channel 21 312 kW average DTV ERP signal at the present KYES site with the present KYES horizontal antenna pattern using a 24 bay UHF antenna with null fill and ½ degree beam tilt. Red represents additional area covered (26.8 dBu) on channel 5 with 6.3 kW average DTV ERP and the existing KYES antenna and transmitter.

Comments on the Sixth Further Notice of Proposed Rule Making

In the above captioned NPRM, the Commission invited comment on several issues, upon which Fireweed hereby respectfully offers the following:

Low Band VHF Spectrum. The NPRM proposes a "Core area" option that, following transition, would remove present channel 2-6 from the broadcast television service. The NPRM asks for comment on ..."our assessment that VHF channels 2-6 are less suitable for broadcasting because of high levels of noise" and asks for specific engineering analysis on "...the longer range propagation characteristics of channels 2-6..." and higher levels of noise (Paragraph 35). The Commission, in Appendix C of the Initial Regulatory Flexibility Analysis ("IRFA") seeks comment on impact on smaller entities, and:

> "...whether the Commission should adopt measures that will assist small stations (as classified under either the SBA definition or their number of employees) in their transition, ... in their cost to upgrade technical operations..."

FINANCIAL CONSIDERATIONS

Continued Operation of KYES Requires the Low Cost of Low Band VHF. KYES has survived because it was on a Low Band VHF channel.. KYES was built in 1989 in Anchorage Alaska, a very competitive, though small market with 7 commercial TV stations. At that time the market of 98,000 households had NBC (KTUU) , CBS (KTVA) , ABC

(KIMO) , Fox (KTBY), PBS (KAKM), Religious(K20AG), the Cartoon Channel (K14AP), and music TV (K22AG) stations[1].

Anchorage is the 156th TV market. We are aware of no market so small that offers viewers so much over the air choice. If the station is to survive, it has to operate on minimum capital and budget. The low cost of operating on channel 5 is an essential part of the stations budget. VHF is part of the Fireweed's long range plan. We believe that if KYES began operations on, or had to operate on UHF[2], it would no longer be in existence.[3]

KYES transmits from a site 1,000 feet higher than any other Anchorage VHF station. Due to this elevation it is the only TV station of any kind covering substantial white area.[4] Any attempt to replicate this service on a UHF channel is doomed to failure. Even if

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[1] At present there are seven local commercial TV stations. K22AG is now a translator of KTBN, Los Angeles; K14AP went dark and the, license has been deleted; KDMD-(TV), channel 33, is a new full service Home Shopping Network Affiliate, using a 1 K.W. UHF transmitter.

[2] Digital or NTSC, UHF costs more. See Comparability for UHF Television, Final Report, UHF Comparability Task Force, Office of Plans and Policy, FCC, Sept. 1980.Table 5-2. In 1980 dollars, total discounted cost of investment for a UHF transmitter plant of 2 MW peak output (equal to about 500 kW DTV average) was $2.58 million, high band VHF was $1.044 million, and low band VHF was $.887 million.

[3] The present KYES 100 kW transmitter plant cost about $45,000, including two 1 kW drivers, an 18 kW transmitter, a 37 kW single to three phase power converter, and a "home brew" broadcasting antenna. The monthly electric bill is $1,300.

[4] See Figure 1, a coverage map of all Anchorage Full Service TV stations. One penalty KYES pays for providing coverage into white areas is that KYES must operate without three phase electrical power, and must pay for generation of the extra phase. Conversion cost more as power increases. UHF requires far more electrical power than VHF for equal coverage using FCC f(50,50) or f(50,90) curves. Although Fireweed believes UHF can be superior to VHF under certain conditions, VHF is clearly superior where terrain obstructs coverage, and costs must be kept low, as in Anchorage.

At the present time, Anchorage area DBS reception requires a 1.8 meter dish, not the 18" dish required in the lower 48. For all practical purposes, DBS is not available at a reasonable price.

Although Paragraph 40 of the NPRM assumes higher cable penetration on the edges of station coverage, no cable system operates between the KYES grade A and B contours. For many persons living between the KYES grade A and grade B contour, KYES is the only television service of any kind at less than the cost of a large satellite dish.

required zoning and Radio Exposure limits to humans could be met, and even if money were available to construct and run a mammoth transmitter[5] (see Attachment A) , replication of KYES VHF service on UHF would require a transmitter of higher power than ever before built in North America.

VHF Spectrum Reclamation and the Initial Regulatory Flexibility Analysis. In the IRFA, on page C-5 of the NPRM, the commission states:

> "All of the affected stations will have to operate on the new DTV channels. The cost of equipment to operate on these new channels is expected to vary from $750,000 upwards to $10 million.

We respectfully suggest that should the FCC provide for continued operation on all VHF channels, the costs can be much lower. KYES, and many other small market TV stations already have the most expensive part of a digital transmission plant, their present transmitter and antenna! As in the Charlotte tests, the broadcaster need only change the exciter to switch from NTSC to digital. Today, a digital DVB compliant satellite up link exciter cost $8,700. Today, a hand made Grand Alliance exciter cost $80,000, a cost that is sure to decrease as production ramps up

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[5] It is well known that UHF signals suffer more from terrain obstruction than VHF. It is also known that UHF transmission over the horizon requires very high power. A maximum facility Low Band ("LB") VHF station, (2,000 feet HAAT and 100 K.W. E.R.P. in zone 2) will project a grade B signal to a distance of 80 miles. Under proposed DTV standards, an 80 mile service contour (43.8 dBu F50:90) requires 4 megawatts AVERAGE E.R.P. Since PEAK ERP must be at least four times higher, the UHF DTV broadcaster would have to install a 16 megawatt Peak Power ERP transmitter plant in order to replicate a maximum facility NTSC VHF signal. A VHF to be replicated on UHF having 100 kW at less than maximum height might need even greater power.

It would be preferable to operate a lower powered second channel that reaches most of the city of Anchorage Alaska. KYES could install a standard 1 K.W. LPTV transmitter at the KYES transmitter site, along with a simple, inexpensive LPTV antenna[6] and still reach about 80% of its present audience. KYES already owns a, licensed LPTV station that could be converted to DTV use. So, as of today, KYES could provide a DTV signal to much of our viewing area for the price of an exciter.

When sufficient numbers of DTV sets are in the marketplace, KYES could, at no cost, swap exciters between the UHF and VHF transmitters. The limited coverage UHF signal could continue to provide NTSC service to the dwindling numbers of NTSC TV sets.

Under the Commission's plan, according to the Commission's own statements, the minimum cost of DTV conversion is expected to be at least $750,000. That expense, one which KYES is unable to bear, would vastly reduce KYES rural coverage, much of which is .to white area not served by any other TV station.

Under Fireweed's plan, for much less than $80,000, after transition, KYES could deliver DTV to all the households it does today, on channel 5. During the transition, it could deliver DTV and NTSC to most of those households.

ENGINEERING CONSIDERATIONS

[6] Fireweed owns LPTV station K18CS. It uses a 1 kW UHF transmitter, which can produce peak powers of 1 K.W. equal to about 250 watts DTV average. K18CS uses a Scala SL-8 antenna having a gain multiplier of about 8. Therefore fitting K18CS with a digital exciter would, with the present antenna, produce a DTV power of 2 K.W. average ERP.

The Charlotte Study. The NPRM says the Commission has made an "... assessment that VHF channels 2-6 are less suitable for broadcasting because of high levels of noise". Urban noise should have been expected. In 1977 the NTSC planning factors provide for 14 dB Low Band VHF urban noise adjustment at the Grade A contour and 0 dB at the grade B contour[7]. Of course, a station, such as the Charlotte test station, operating at low power, putting a grade B contour into an urban area, should suffer from far more from noise than a high powered station.

Fireweed believes the assumption that Low Band VHF is too noisy for DTV rests exclusively upon data found in the Field Test Results of the Grand Alliance HDTV Transmission Subsystem , by AMST, Cable TV Labs, and PBS, Sept. 16, 1995 ("Report"). However, that test, the Charlotte study, and related anlysis are inadequate to demonstrate this crucial conclusion. Fireweed's operational experience, in many ways, refutes the conclusion that Low Band VHF is too noisy.

The Report said, at 10% power, VHF channel 6 did very poorly, both with NTSC and DTV. For example, the Report shows in table 3 on page 14 says the percent of locations getting satisfactory reception of NTSC test signals at Charlotte on channel 6 was only 39.6%; but on UHF channel 53 the number was up to 76.3%. If true, Charlotte shows VHF is far inferior to UHF for NTSC.

[7] See A Review of the Technical Planning Factors for VHF Television Service, FCC Office of Chief Engineer, Research & Standards Division, RS77-01, March 1, 1977, Gary S. Kalagian., Table 4A & 4B, Page 8 & 9.

With thousands of VHF and UHF NTSC stations on the air, how and why have UHF stations kept their superiority a secret for so long? One would assume that eventually as the secret advantage of UHF would leak out. We should have witnessed a land rush as ABC, NBC and CBS stations attempted to beat one another to grab up all the major market UHF slots.

Fireweed respectfully suggests that Charlotte does not prove UHF is superior to VHF. It only proved a Low Band VHF station "dropped in" that runs 10% of normal power won't do well compared to a 10% power UHF station received on a tuner fitted with an expensive low noise amplifier.[8]

At Charlotte, VHF Channel 6 had significant handicaps.[9] Yet, when Charlotte DTV power on both UHF and VHF was raised form 10% to 40% of nominal, the higher power UHF signal and VHF signal were equal.[10] In fact, the test shows VHF was superior at

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[8] See Field Test Results of the Grand Alliance HDTV Transmission Subsystem, Sept. 16, 1994, Figure 2, Field Truck RF Distribution System, ATV Field Test project, Charlotte, North Carolina. The Scala Low Noise UHF Preamp, costing $220, is rated at 1.4 dB Noise Figure. Proposed DTV planning Factors suggest a UHF 10 dB noise figure. A UHF transmitter would need 9.1 times more power to overcome that extra receiver noise. At Charlotte, the DTV station operated at 31.6 K.W. E.R.P. To account for a TV set with 10 dB N.F. the station would have needed 287.6 K.W. E.R.P. for equal coverage. To generate this E.R.P. the transmitter would need peak power capability of 1.15 Megawatts.
Since VHF reception is more limited by man made and natural noise than receiver noise, a low noise pre amp is less beneficial at VHF.

[9] See Field Test Results of the Grand Alliance HDTV Transmission Subsystem, Sept. 16, 1994, Page 10, paragraph 2 about interference from FM stations. In addition, channel 6 TV stations WECT, WVVA, WATE and WJBF are located 134 to 188 miles from the DTV test transmitter. Their respective F50:10 field strengths at the DTV transmitter site are 36.46, 28.6, 20.2 and 31.1 dBu, (based upon average HAAT and ERP). This much co-channel interference should seriously impair NTSC or DTV reception of a drop in channel 6.

[10] Table 8 and 9 on Page 19 of the tests show that when power was raised from 10% of proposed DTV maximum to 40%, UHF and VHF both had acceptable signals at 94% of sites surveyed. Especially important to Fireweed, in the band from 50 to 56 miles, the most distant band measured, VHF beat out UHF by 4%. Fireweed believes that a VHF full power DTV station properly spaced from co-channel neighbors will prove vastly superior to UHF at distances from the transmitter of 56 miles or more.

greater distance.[11] Either way, low powered or high powered, the presence of urban noise is not a new discovery. In 1977 the NTSC planning factors provided for a 14 dB Low Band VHF urban noise adjustment at the Grade A contour and 0 dB of adjustment at the grade B contour[12]. Of course, a station, such as the Charlotte test station, operating at low power, putting a grade B contour into an urban area, should suffer from far more from noise than a high powered station.

Fireweed believes that much of the problem in Charlotte at low power on channel 6 was a normal high level of urban noise[13]. This was overcome when DTV power was raised to 2.52 kW. At full proposed low band VHF power, 6.3 kW, Fireweed expects the DTV Cliff contour to extend beyond present NTSC grade B.

Finally, at Charlotte, in every case DTV proved superior to NTSC. VHF stations would lose nothing, and could convert to DTV at much lower cost by switching their present NTSC facility to DTV on their present channel.

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[11] Charlotte test broadcast antennas were about 1,330 feet above ground on a site with little elevation above average terrain. The radio horizon from that site is about 50 miles distant. Given sufficient power, VHF will better propagate over the horizon, so we would expect channel 6 to begin to excel as the signals hit the horizon.

[12] See A Review of the Technical Planning Factors for VHF Television Service, FCC Office of Chief Engineer, Research & Standards Division, RS77-01, March 1, 1977, Gary S. Kalagian., Table 4A & 4B, Page 8 & 9.

[13] It is safe to assume that as population density increases, so will urban noise. New technology, especially computers, have created new sources of interference. As computers clock faster, we can expect their R.F. pollution to march up the spectrum. Today, 100 MHz computers are common. In the future, we may see a reduction in VHF noise and an increase in UHF noise as computers approach UHF frequencies.

The Notice also fails to explain the belief that noise prone frequencies used for TV channels 2-6, with the huge installed base of home TV receivers, would somehow be more useful or more valuable if shifted away from television use.

In Alaska VHF propagation is superior to UHF

Several factors distinguish Alaska from Charlotte.

1. Urban noise levels are lower as there is less urban area and lower population density within urban areas.
2. Alaska has substantial white area, not served by any full service TV station or cable. The ability of VHF signals to propagate over the horizon allows some degree of service where none would otherwise exist.
3. Interference from full service stations is less, or non-existent. In the case of KYES, for example, the closest US full service channel 5 is in Seattle, more than 2,400 miles distant, the closest adjacent TV station is in Spokane, on channel 6.
4. Very rugged terrain, such as that found in Alaska, is best served with longer wavelengths that better overcome terrain obstruction.
5. It is claimed by some that translators can fill in those places where the UHF signal cannot replace a present VHF service. However, in Alaska, many of these areas have too few people to justify an expensive translator, or translator site rental.

KYES Viewers Need VHF propagation.

Lets make the assumption that KYES could afford to broadcast on a UHF DTV channel such as 21, the channel assigned KYES in the NPRM, from its present site, using an antenna of the same vertical height (40 feet vertical aperture) , the same horizontal directional pattern, from the same position on the same 75 foot tall tower (maximum allowed under Municipal zoning code) with a transmitter of about twice present peak power[14] (DTV=30 kW peak, or 7.5 kW average)[15]. This hypothetical station might have 312 kW average DTV ERP, nearly 10 times that used at Charlotte.

Close in Multipath and Shadows: Multipath and shadowing will become worse at UHF costing cost KYES loss of coverage within its city of license. See Figure 3.

KYES transmits 1890 feet above part of Anchorage known as Eagle River. Much of Eagle River is terrain shielded from KYES. A switch from VHF to UHF will deepen the shadows near the transmitter. Use of a high gain transmitting antenna causes more loss of signal near the tower, leading to multipath, while signals directed to nearby, higher mountains will still be strong, exaggerating reflections and multipath.

Loss of Presently Covered White Area. Figure 1 shows the grade B contour of all Anchorage Alaska television stations. No fringe signals from any other market can be seen

[14] Present horizontal pattern power multiplier is about 2.175, a 24 bay antenna with null fill and beam tilt would gain 20.8. 3" coax, 100 ' long loss is X .918 at 512 MHz. If ERP in the main lobe is 312 kW, then TPO=312/20.8*2.175*.918 or 7.512 kW. If peak to average is 6 dB, or *4, then peak=7.512*4=30.05 kW peak.

[15] In Advanced Television Transmission, Planning Your Stations Transition, T. Vaughan Associates, 1995, table VII-4, page VII-5, Section VII, shows a peak to average ratio of 6 dB is optimistic. The table shows a 30 kW IOT UHF transmitter as capable of only 6.8 kW average DTV power, less than used in the estimate herein. In spite of our optimism, the table estimates transmitter cost at $420,000. Our hypothetical antenna is similar to

within the Anchorage market. In the North and South West directions, KYES covers area and communities not covered by any other television station. See, for example, Talketna Alaska, a town of 500 people having no cable TV and no DBS (the DBS signal is weak). Only KYES includes Talkeetna within its grade B contour. (Talkeetna is denoted in Figure 1 and Figure 2 as the red + symbol under the letter T in Matanuska.)

Figure 2 shows loss of service to Talkeetna should KYES convert to UHF DTV. Converting channel 5 to DTV would not reduce KYES channel 5 coverage. We have shown that if KYES is forced to switch to UHF, Talkeetna might lose its only television service.

CONCLUSIONS

- All TV channels, especially VHF should continue to be available for television broadcasting. It is needed for service in some rural areas. The Commission lacks evidence that channels 2-6 are disadvantaged for TV broadcasting, and the entire history of the service since 1947 refutes that notion.

- Minimum required DTV power should, in no event, be greater than that presently required for NTSC (see 73.614 & 73.685(a)).

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an Andrew ALP24-3HSPR, able to handle up to 28 kW, costing $49,000 (phone call to Jenny Schaack at Andrew 11-20-96.

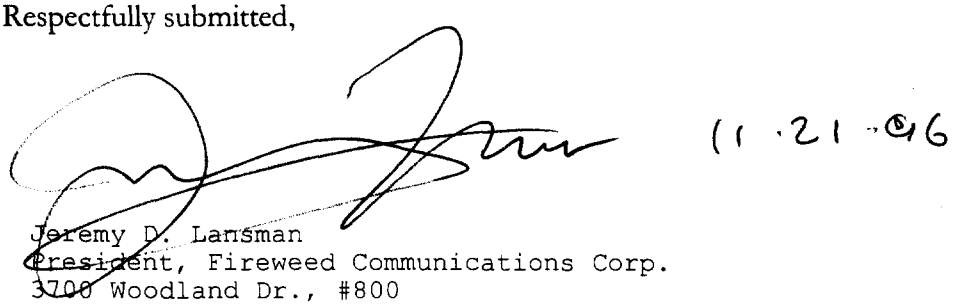
- Stations should be able to elect a maximum DTV loaner channel facility power of 10% or less of that required for replication, with protection to be limited to the lower power. Protection to the low power loaner channel will assume NTSC operation to the grade A contour.

- A station making such election should be allowed to operate the loaner channel with NTSC upon conversion of its original channel to DTV, and may operate the loaner channel with NTSC until the end of transition. At the end of transition, the station making such election would continue to operate DTV on the original channel and submit the loaner license for cancellation.

- If, in the future, spectrum is auctioned, or otherwise awarded for new entry, the new spectrum user should be fully responsible to any TV broadcast station, LPTV or translator, for all costs incurred to replace any lost coverage or replace, broadcast equipment. Such costs should include higher increased cost of transmission, electricity, site rental and equipment maintenance as required to maintain the same level of broadcast service. The new spectrum entrant would guarantee such operating payments so long as the entrant operates its facility. If such coverage cannot be replaced, the broadcast station, LPTV station, or translator may continue to operate indefinitely.

For these reasons, Fireweed requests that the Commission's proposals in the Sixth Further Notice of Proposed Rule Making be modified to reflect the ideas and concerns stated herein.

Respectfully submitted,



11-21-06

Jeremy D. Lansman
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Anchorage, Alaska, 99517
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907-243-0709 (fax)
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ATTACHMENT A
REQUEST FOR DTV TRANSMITTER QUOTE
SENT TO HARRIS CORP. & OTHERS

As, per our conversation, here is a request for price and availability for a digital TV transmission plant for a KYES-High Definition transmitter. We desire a plant that can meet the requirements of the FCC's 6th Report and order, in that it should match the coverage of KYES-(TV).

However, we recognize that an operation that would match KYES coverage might not be practical, so we are requesting two proposals.

Three phase power is not available at our present transmitter site. Thus we request that you provide a line item in the proposal to engineer and build a single phase modification of the transmitter. We will compare that cost to the cost of having the utility provide three phase power at our location.

And exact match would use the same antenna gain in the horizontal and vertical planes, so that, aside from wavelength, coverage below the antenna tower would be the same as that presently enjoyed by KYES. The community of Eagle River at about 200 feet AMSL, a portion of the Municipality of Anchorage, is located under the 1,900 foot AMSL transmitter site. On the other side of Eagle River and about 5 miles away we have a mountain more than 4,100 feet AMSL. In addition, people reside on the hillside directly below our tower. Therefore, due to bouncing off that mountain and others, we would lose coverage to multipath is we increase antenna gain.

Our present gain, overall, is a multiple of 8.7. Transmission line run is about 70 feet. In waveguide, transmission line loss would be negligible, and will be ignored. The FCC has determined that our coverage will be matched at an E.R.P. of 4.897 Megawatts, average.

Thus: (4.9MW erp/8.7 ant gain)= TPO 563.3 KW.
AV TPO=563.3 x 6 dB = 2.25 MW Peak TPO

Please quote price for this plant, both with single phase and polyphase power.. Please indicate peak electric utility load.

In the case of reduced coverage due to higher antenna gain in the vertical plane, I have used, as an example, a 15 level Andrew with a P2 pattern. The P2 approximates the present KYES horizontal plane pattern.

Total peak antenna gain is 33. Thus: (4.9 MW erp /33 ant gain)= 148.5 KW TPO. Again, using a 6 dB peak to average ratio, peak power would be 148.5x4=594 kw.

Please, also quote a cost of plant and power consumption for both single and polyphase electric service in the 594 KW case.

Thank you very much for your time.

Yours Truly,

Jeremy Lansman
President, Fireweed Communications Corp
KYES-(TV)
Anchorage AK.
fireweed@alaska.net

REPLY FROM HARRIS CORP.

Hi Jeremy,

Here are some very budgetary quotes for the 2.25MW and 594kW peak DTV power transmitter systems. These do not include the transmitter building, antenna and waveguide, AC power distribution, building HVAC, lighting, spare parts, etc.

From our point of view, these two solutions do not represent an economically viable approach to DTV. A lower service area, or fill-in using LPTV translators, may be required.

We anticipate that most stations would not choose a transmitter of larger than 1 or 2 IOT's (70kW or 140kW peak DTV power).

Regards, Martyn Horspool - UHF TV Product Manager

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1. 2.25MW Peak Power Sigma IOT Transmitter
   (uses 32 x 70 kW amplifiers)

a)	Transmitter Sigma CD280 x 8	5,353,600
b)	IOT7360/cct assy x 32	2,336,800
c)	RF system & waveguide comb	1,100,000
d)	Voltage regulator x 8	320,000
e)	Surge Eliminator x 8	168,000
f)	Installation c/o & proof	800,000
g)	Misc hardware & parts	200,000
	Total Transmitter	$10,278,400

Preliminary specifications:

Operating voltage:	480V, 3-phase Wye, +/-2%
Power consumption:	2.32 MW
Power factor:	.9 typical
Dimensions:	158' W x 55" D x 72" H
Weight:	58,000 lbs

Note: A single phase version is not practical, due to the high line currents. The Harris CD280 transmitter is only offered as a 480 volt, 3-phase system.

2. 594kW peak Power Sigma IOT Transmitter
(Sigma CD280 x 2, plus 1 tube)

a)	Transmitter Sigma 2 x CD280+1	1,439,000
b)	IOT7360/cct assy x 9	657,225
c)	RF system $ w/g combiner	200,000
d)	Voltage Regulators	100,000
e)	Surge eliminators	47,000
f)	Installation checkout & proof	200,000
g)	Misc hardware & parts	60,000
	Total transmitter	$2,703,225

Preliminary specifications:

Operating voltage:	480V, 3-phase Wye, +/-2%
Power consumption:	576kW
Power factor:	.9 typical
Dimensions:	46' W x 55" D x 72" H
Weight:	17,000 lbs

Note: A single phase version is not practical, due to the high line currents. The Harris CD280 transmitter is only offered as a 480 volt, 3-phase system.